ECONOMICS 3020: Accelerated Macroeconomics

Baker Laboratories 119

MWF 10:10 AM - 11:00 AM
A Model of the Natural Rate

Notation:

\[ L = \# \text{ of workers in labor force} \]

\[ E = \# \text{ of employed workers} \]

\[ U = \# \text{ of unemployed} \]

\[ U/L = \text{unemployment rate} \]
Transition between Employment & Unemployment

\[ S \times E \]

\[ f \times U \]

Employed

Unemployed
Solving for the “Equilibrium” Unemployment Rate

\[ f \times U = s \times E \]
\[ = s \times (L - U) \]
\[ = s \times L - s \times U \]

Solve for \( \frac{U}{L} \):
\[ (f + s) \times U = s \times L \]

So,
\[ \frac{U}{L} = \frac{s}{s + f} \]
Each month, 1% of employed workers lose their jobs ($s = 0.01$)

Each month, 19% of unemployed workers find jobs ($f = 0.19$)

Find the natural rate of unemployment:

$$\frac{U}{L} = \frac{s}{s+f} = \frac{0.01}{0.01+0.19} = 0.05, \text{ or } 5\%$$
A policy that aims to reduce the natural rate of unemployment will succeed only if it lowers $s$ or increases $f$. 
When deciding the policy aimed on reduction of unemployment it is crucial that the government takes into account the response of the all agents to policy action in question.

Policies aiming to reduce separation rate $s$, may also cause reduction in job finding rate $f$. 

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ECON 3020 • ACCELERATED MACROECONOMICS • ABC TEXT CHAPTER 3
Why is there Unemployment?

If job finding were instantaneous (f = 1), then all spells of unemployment would be brief, and the natural rate would be near zero.

There are two reasons why f < 1:

• Job search
• Wage rigidity
Job Search & Frictional Unemployment

Frictional unemployment: caused by the time it takes workers to search for a job

Occurs even when wages are flexible and there are enough jobs to go around
Job Search & Frictional Unemployment

Occurs because

• workers have different abilities, preferences
• jobs have different skill requirements
• geographic mobility of workers not instantaneous
• flow of information about vacancies and job candidates is imperfect
Definition: changes in the composition of demand among industries or regions

Example: Technological change

Increases demand for computer repair persons, decreases demand for typewriter repair persons.
Example: Policy

A new international trade agreement causes greater demand for workers in the export sectors and less demand for workers in import-competing sectors.

It takes time for workers to change sectors, so sectoral shifts cause frictional unemployment.
Industry shares in U.S. GDP, 1960

- Services: 57.9%
- Agriculture: 9.9%
- Manufacturing: 28.0%
- Other industry: 4.2%
Industry shares in U.S. GDP, 1960

- Agriculture: 72.0%
- Manufacturing: 8.5%
- Other industry: 17.8%
- Services: 1.7%
Examples:
Late 1800s: decline of agriculture, increase in manufacturing

Late 1900s: relative decline of manufacturing, increase in service sector
Sectoral Shifts Abound

Example:
1970s energy crisis caused a shift in demand away from huge gas guzzlers toward smaller cars.

In our dynamic economy, smaller (though still significant) sectoral shifts occur frequently, contributing to frictional unemployment.
Public Policy and Job Search

Govt programs affecting unemployment:

Govt Employment Agencies:
disseminate info about job openings to better match workers & jobs

Public Job Training Programs:
help workers displaced from declining industries get skills needed for jobs in growing industries
Unemployment Insurance

UI pays part of a worker’s former wages for a limited time after losing his/her job.

UI increases search unemployment, because it:
• reduces the opportunity cost of being unemployed
• reduces the urgency of finding work – hence, reduces f
Unemployment Insurance

Studies: The longer a worker is eligible for UI, the longer the duration of the average spell of unemployment.
Unemployment Insurance

Benefits of Unemployment Insurance:

By allowing workers more time to search, UI may lead to better matches between jobs and workers, which would lead to greater productivity and higher incomes.
Unemployment from Real Wage Rigidity

If the real wage is stuck above the eq’m level, then there aren’t enough jobs to go around.
Unemployment from Real Wage Rigidity

If the real wage is stuck above the eq’m level, then there aren’t enough jobs to go around.

Then, firms must ration the scarce jobs among workers.

**Structural unemployment:**
the unemployment resulting from real wage rigidity and job rationing.
Reasons for Wage Rigidity

Minimum wage laws

Labor unions

Efficiency wages
The minimum wage is well below the eq’m wage for most workers, so it cannot explain the majority of natural rate unemployment.

However, the minimum wage may exceed the eq’m wage of unskilled workers, especially teenagers.
However, the minimum wage may exceed the equilibrium wage of unskilled workers, especially teenagers.

If so, then we would expect that increases in the minimum wage would increase unemployment among these groups.
In Sept 1996, the minimum wage was raised from $4.25 to $4.75. Here’s what happened:

<table>
<thead>
<tr>
<th>Unemployment rates, before &amp; after</th>
<th>3rd Q 1996</th>
<th>1st Q 1997</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teenagers</td>
<td>16.6%</td>
<td>17.0%</td>
</tr>
<tr>
<td>Single mothers</td>
<td>8.5%</td>
<td>9.1%</td>
</tr>
<tr>
<td>All workers</td>
<td>5.3%</td>
<td>5.3%</td>
</tr>
</tbody>
</table>

Other studies: A 10% increase in the minimum wage increases teenage unemployment by 1-3%.
Unions exercise monopoly power to secure higher wages for their members.

When the union wage exceeds the eq’m wage, unemployment results.
Employed union workers are insiders whose interest is to keep wages high.

Unemployed non-union workers are outsiders and would prefer wages to be lower (so that labor demand would be high enough for them to get jobs).
## Union Membership and Wage Ratios by Industry

<table>
<thead>
<tr>
<th>Industry</th>
<th># Employed (1000s)</th>
<th>U % of Total</th>
<th>RBU % of Total</th>
<th>Wage Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mining</td>
<td>531</td>
<td>12.3%</td>
<td>12.9%</td>
<td>103.4</td>
</tr>
<tr>
<td>Construction</td>
<td>6,881</td>
<td>18.4</td>
<td>19.0</td>
<td>151.0</td>
</tr>
<tr>
<td>Manufacturing</td>
<td>18,149</td>
<td>14.6</td>
<td>15.5</td>
<td>105.9</td>
</tr>
<tr>
<td>Transportation</td>
<td>4,441</td>
<td>24.1</td>
<td>25.4</td>
<td>127.8</td>
</tr>
<tr>
<td>Comm. and pub util</td>
<td>2,981</td>
<td>22.6</td>
<td>23.7</td>
<td>104.2</td>
</tr>
<tr>
<td>Wholesale trade</td>
<td>4,540</td>
<td>5.5</td>
<td>5.9</td>
<td>105.8</td>
</tr>
<tr>
<td>Retail trade</td>
<td>20,505</td>
<td>4.5</td>
<td>5.0</td>
<td>117.8</td>
</tr>
<tr>
<td>Fin, insu, and real est</td>
<td>7,648</td>
<td>2.1</td>
<td>2.8</td>
<td>90.1</td>
</tr>
<tr>
<td>Services</td>
<td>34,261</td>
<td>5.9</td>
<td>6.8</td>
<td>103.3</td>
</tr>
<tr>
<td>Government</td>
<td>19,155</td>
<td>37.4</td>
<td>41.8</td>
<td>121.1</td>
</tr>
<tr>
<td>All</td>
<td>119,092</td>
<td>13.6%</td>
<td>15.0%</td>
<td>118.0</td>
</tr>
</tbody>
</table>
Efficiency Wage Theory

Theories in which high wages increase worker productivity:

• Attract higher quality job applicants
• Increase worker effort and reduce “shirking”
• Reduce turnover, which is costly
• Improve health of workers (in developing countries)
Efficiency Wage Theory

The increased productivity justifies the cost of paying above-equilibrium wages.

The result: unemployment
Use the material we’ve just covered to come up with a policy or policies to try to reduce the natural rate of unemployment.

Note whether your policy targets frictional or structural unemployment.
Use the material we’ve just covered to come up with a policy or policies to try to reduce the natural rate of unemployment.

Note whether your policy targets frictional or structural unemployment.
# Duration of U.S. unemployment, 93-02 (Average)

<table>
<thead>
<tr>
<th># of weeks unemployed</th>
<th># of unemployed persons as % of total # of unemployed</th>
<th>amount of time these workers spent unemployed as % of total time all workers spent unemployed</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-4</td>
<td>39%</td>
<td>6.5%</td>
</tr>
<tr>
<td>5-14</td>
<td>31%</td>
<td>20.5%</td>
</tr>
<tr>
<td>15 or more</td>
<td>30%</td>
<td>73.0%</td>
</tr>
</tbody>
</table>
The Duration of Unemployment

The data:

More spells of unemployment are short-term than medium-term or long-term.

Yet, most of the total time spent unemployed is attributable to the long-term unemployed.
The Duration of Unemployment

This long-term unemployment is probably structural and/or due to sectoral shifts among vastly different industries.

Knowing this is important because it can help us craft policies that are more likely to succeed.
Actual & natural rates of unemployment in the U.S.
The Minimum Wage

The trend in the real minimum wage is similar to the behavior of the natural rate of unemployment.

- nominal (in current dollars)
- real (in today's dollars)
## Union Membership

### Union membership selected years

<table>
<thead>
<tr>
<th>Year</th>
<th>Percent of labor force</th>
</tr>
</thead>
<tbody>
<tr>
<td>1930</td>
<td>12%</td>
</tr>
<tr>
<td>1945</td>
<td>35%</td>
</tr>
<tr>
<td>1954</td>
<td>35%</td>
</tr>
<tr>
<td>1970</td>
<td>27%</td>
</tr>
<tr>
<td>1983</td>
<td>20.1%</td>
</tr>
<tr>
<td>2001</td>
<td>13.5%</td>
</tr>
</tbody>
</table>

Since the early 1980s, the natural rate of unemployment and union membership have both fallen.

But, from 1950s to about 1980, the natural rate rose while union membership fell.
Since mid-1980s, oil prices less volatile, so fewer sectoral shifts.
Demographics

1970s:

The Baby Boomers were young. Young workers change jobs more frequently (high value of $s$).

Late 1980s through today:

Baby Boomers aged. Middle-aged workers change jobs less often (low $s$).
Rise in European Unemployment

The graph shows the percent unemployed from 1960 to 2000. The percent unemployed increased sharply in the 1980s, rising to over 12% by the end of the decade. There was a slight decline in the early 1990s, but the unemployment rate remained high. From 1995 onwards, there was a gradual decline.
Rise in European Unemployment

Two explanations:

1. Most countries in Europe have generous social insurance programs.

2. Shift in demand from unskilled to skilled workers, due to technological change.
Summary

The natural rate of unemployment

- The long-run average or “steady state” rate of unemployment
- Depends on the rates of job separation and job finding
Summary

Frictional unemployment

• Due to the time it takes to match workers with jobs

• May be increased by unemployment insurance
Structural unemployment

- Results from wage rigidity - the real wage remains above the equilibrium level

- Causes: minimum wage, unions, efficiency wages
Duration of unemployment

- Most spells are short term
- But most weeks of unemployment are attributable to a small number of long-term unemployed persons
Behavior of the natural rate in the U.S.

• Rose from 1950s to early 1980s, then fell

• Possible explanations: trends in real minimum wage, union membership, prevalence of sectoral shifts, and aging of the Baby Boomers
European unemployment

• Has risen sharply since 1980

• Probably due to generous unemployment insurance there and a technology-driven shift in demand away from unskilled workers